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OCEANUS

Gulf Stream Information - Bermuda Race



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THIS special issue of OCEANUS has been prepared for the use of navigators on the yachts participating in the 1960 Newport-Bermuda race of The Cruising Club of America. Since 1954, the Woods Hole Oceanographic Institution has tried to be of help in the location of the Gulf Stream just prior to the race.

Our thanks are due to Mr. Alfred Loomis and many others for their appreciation which has encouraged us to prepare this information for the third time since 1954.

We wish you fair winds and steady helmsmen. May Neptune and Aeolus be with you.

Paul M. Fye,

Director

OCEANUS is a periodical devoted to presenting oceanographic research to the Associates of the Woods Hole Oceanographic Institution and other friends of the sea. The Associates consist of individuals, corporations and other organizations who aid in the financial support of the Institution's research.

Rules of Thumb for Crossing the Gulf Stream

Basic Rule

As soon as you have crossed the 100 fathom curve start taking water temperatures once an hour, to establish the temperature of the Continental Slope water. This will probably be about 65° to 66°. Sudden decreases and increases from 5° to 10° in magnitude may be encountered, but these will always be less than 70° F.

Northern Hemisphere: When the water is getting WARMER, you are being set to the left of your course. When the water is getting COLDER, you are being set to the right of your course.

Chief Rule

Continue the measurements until you encounter an increase of 5° or more, south of 39° North. This will probably be in the ranges of 70° to 75°, or 73° to 78°. The strongest current will be about ten miles beyond this point. The temperature may rise a further 3° for a total of 8° over the Slope water.

Near the axis of the current, velocities up to five knots will be found over a width of about 20 miles. Normally, there are weaker countercurrents to either side of the Stream. For this reason, the average velocity across a somewhat wider path (say 60 miles) has been marked on charts as less than three knots. Assuming your average speed is seven knots, you may expect to be set to leeward about 25 miles. With the normal southwesterly wind it would be best to work to windward of the straight course before and after entering the current.

Generally, you will not enter the current at right angles, although this seems to have been the case in the 1958 race. If you do so, the change in temperatures can be extremely abrupt from 67° to 80° in about 10 miles, or even within a few ships' lengths. Frequently, heavy patches of Sargassum weed are found on the inshore edge of the Stream. In winds of Beaufort 2 or less, the patches will be aligned with the current. This will help you in identifying the direction of the current as the surface temperatures may not be relied upon in winds of Beaufort 2 or less. In stronger winds the Sargassum will be aligned downwind not down current. In winds of Beaufort 3 or more, the change in sea surface roughness may be very marked upon entering the Gulf Stream, particularly if the wind is against the current.

To Find the Direction of the Current

In light airs watch the Sargassum weed and other debris which tends to align along the edge of the current. Streaks may also be seen and cumulus clouds or a front may be associated with the current in fair weather.

If the warming is abrupt (for instance, an increase from 70 to 78 in less than 10 miles) you are crossing nearly at right angles.

If the change is gradual, you are crossing obliquely. The current is probably on the starboard quarter, possibly on the starboard bow. If a course change to port brings you into colder water, you were sailing with the current. If a course change to port brings you into warmer water, the current is on the bow. The opposite holds true for course changes to starboard.

If the temperature remains constant at 5° warmer than the Slope water, the current is fore and aft. Sail port or SB to determine whether it is ahead or astern.

If you find yourself set in an unfavorable direction, the thing to do is to try to sail towards a direction at right angles to the set. In other words, get across an unfavorable current as fast as you can.

The Offshore Edge

Do not abandon temperature measurements after entering the Stream. The transition from Gulf Stream water to Sargasso water is also abrupt, indicated by a drop from 80° or 79°, to 73° or 74° F.

Generally, there is a significant countercurrent on the offshore side which has been logged at two knots, more often at one knot, and sometimes is not present. There is a weak clockwise current around Bermuda.

General Remarks

The simplest method of applying this information is by keeping a rough contour chart of the surface temperature. The current will be flowing along the contour lines and the swiftest part will be found just offshore of the position where the contours are closest together. By using the chief rule the current direction may be established.

The ideal Bermuda Race (for an oceanographer) would be one where moderate SE winds prevailed during the second day. SE winds would necessitate frequent course changes so that the ship's track would cover an area rather than a single line. It is difficult to contour points on one line only, since it does not show the direction of the contours.

If the Gulf Stream is flowing at right angles to the Newport-Bermuda Rhumb line, temperature information will be of little value. But if the Stream is flowing nearly parallel to the Rhumb line, as it has done in four out of nine cases when it was observed by our research vessels, then temperature data will be of utmost value.

Caution:

On sunny days when the wind is Beaufort 2 or less surface temperatures are less reliable than indicated by the rules.

The Way Back:

The current pattern changes in about one week to ten days, so that on your way back from Bermuda, the situation may be more complex or more simple.

Latest

During the months of April and May, 1960, the Gulf Stream System remained unusually steady.

But

We found a counterclockwise eddy south of the Stream, centered in April at 36° N. and 64° W. This eddy may have wandered westward or disappeared.

Currents of 2—3 knots were found as follows:

Southerly set at 36° N.— $66^{\circ} 30'$ W.

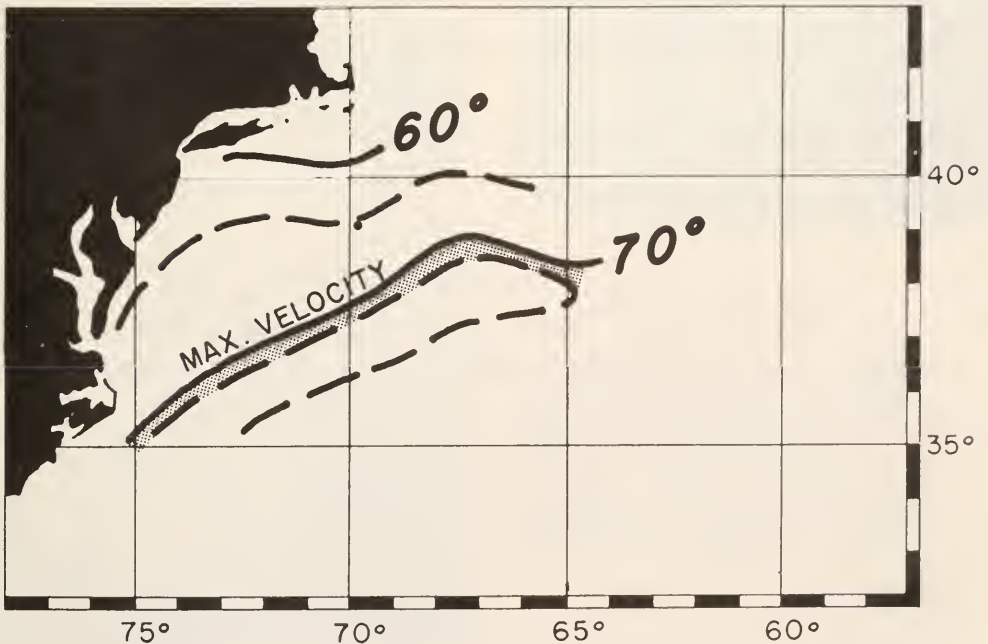
Westerly set at 37° N.— $64^{\circ} 30'$ W.

Easterly set at 35° N.— $64^{\circ} 30'$ W.

Northerly set at 37° - 38° N.— $62^{\circ} 30'$ W.

Temperatures will increase if you enter this warm core eddy.

Typical surface temperatures to be expected during June. Sudden decreases or increases may occur in Slope Water but always less than 70° F.





In winds of Beaufort 2 or less streaks on the sea surface may indicate the inshore edge of the Gulf Stream.

Gulf Stream Survey

Three of our ships, the ATLANTIS, CRAWFORD and CHAIN, have been conducting a Gulf Stream Investigation during April, May and June. Practically all of the work was done to the eastward of the Newport-Bermuda Rhumb line.

The complexity of the Gulf Stream System was confirmed and it appears that the single current concept is wrong. **Oceanus**, Vol. VI, 4, June 1960, contains additional information for your interest.



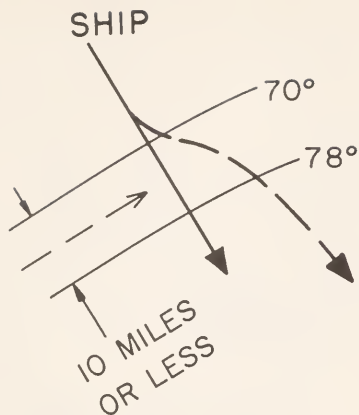
- ◀ Aerial view of the inshore edge of the Stream during a calm day. Note the complexity of the edge which may consist of Sargassum and other debris. The warm water is to the right in this view.

Sargassum weed may line up with the current in winds of Beaufort 2 or less. ▶

With lighter winds the Sargassum will trend downwind.



- ◀ Occasionally, a cloud front is associated with the inshore edge of the Stream. In the beginning of May "TIROS" showed a line of fibrous clouds from Florida to Hatteras, thence turning east.

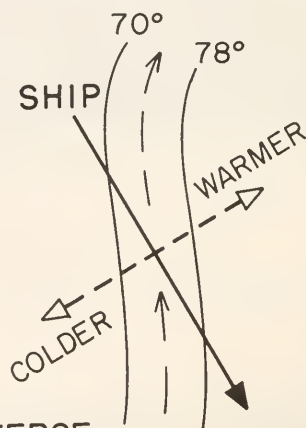


CROSS CURRENT

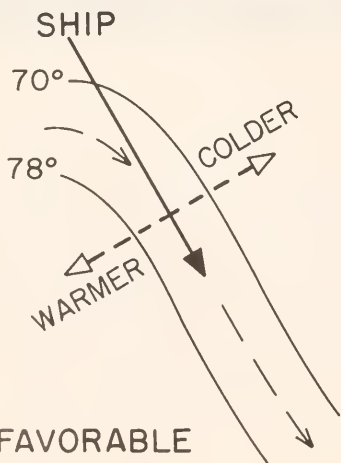
◀ Crossing at right angles. Temperature increase may occur from within a few minutes to one hour of sailing.

Adverse current. ▶

Gradual increase in temperature, you are crossing obliquely. Only a course change will tell you whether you are with or against the current.



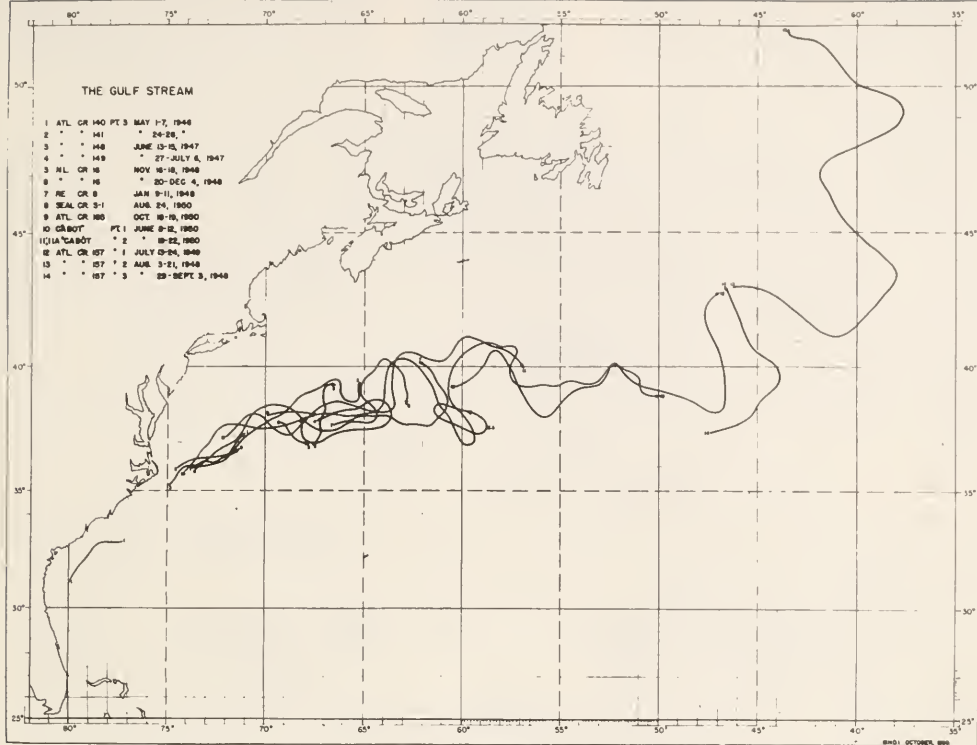
ADVERSE CURRENT



FAVORABLE CURRENT

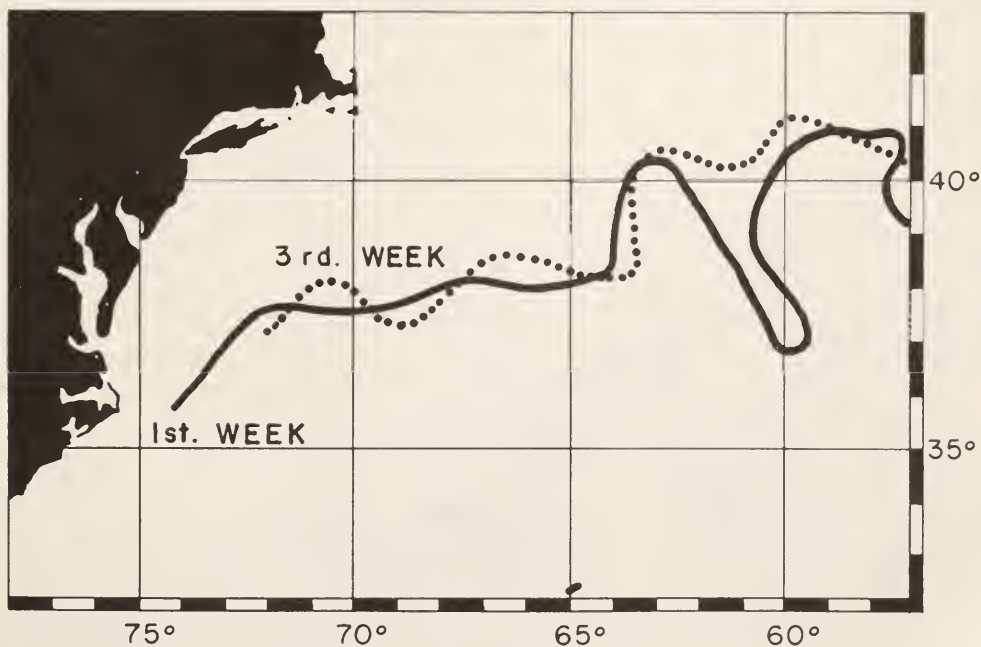
◀ Favorable current.

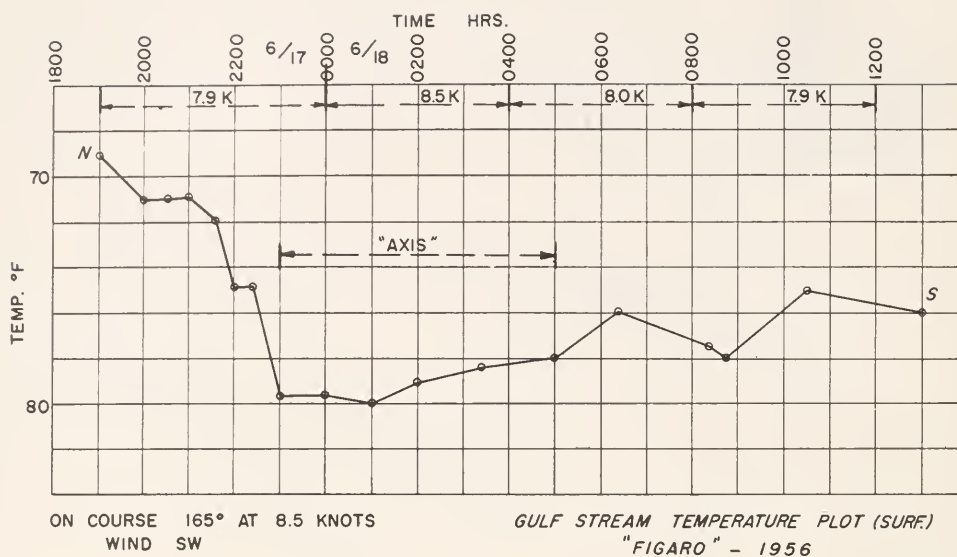
As above. Watch the Sargassum, or surface streaks in light weather.



The variable positions in which the Gulf Stream has been found in recent years, drawn as a single current. A series of overlapping currents appear to exist.

Change of position of the inshore edge found during a 1950 survey. The long loop broke off and became a counterclockwise eddy.





Temperature plot as kept by "Figaro" in 1956. Copies of this base chart will be supplied by the Institution. We have reversed the temperature column (higher temperatures on top) and added room for further remarks and positions.

It will be most appreciated if the filled-in forms will be returned to Woods Hole after the race. A return envelope is provided.

Good Sailing

The Woods Hole Oceanographic Institution wishes you a successful race, good weather and a fair Gulf Stream.



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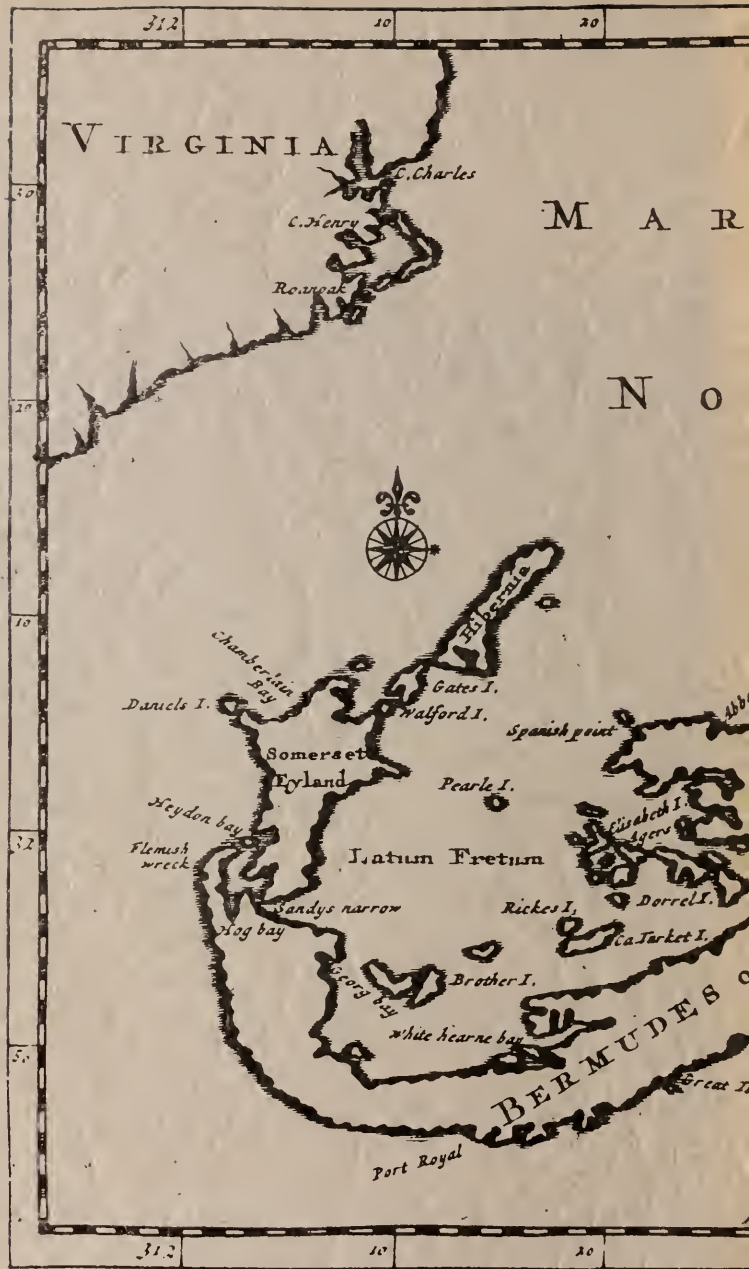
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